



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US99/27758 <b>(22) International Filing Date:</b> 23 November 1999 (23.11.99)  <b>(30) Priority Data:</b> 60/109,549                      23 November 1998 (23.11.98)      US  <b>(71) Applicant:</b> NI4U CORPORATION [US/US]; 63 Solomon Pierce Road, Lexington, MA 02173 (US).  <b>(72) Inventors:</b> IONSON, James, A.; 63 Solomon Pierce Road, Lexington, MA 02173 (US). REISS, Wanda, T.; 33 Briant Drive, Sudbury, MA 01776 (US). CALAWAY, Douglas, D.; 9 Holt Road, Amherst, NH 03031 (US).  <b>(74) Agent:</b> COHEN, Gary, M.; Strafford Building Number Three, Suite 300, 125 Strafford Avenue, Wayne, PA 19087-3318 (US).		<b>(81) Designated States:</b> CA, CN, IL, JP, KR, MX, NO, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> SYSTEM AND METHOD FOR TAKING, SELECTING AND PROCESSING ELECTRONIC PICTURES  <div style="text-align: center;"> <pre> graph LR     2[IMAGE ACQUIRING DEVICE] --&gt; 4[INTERFACING DEVICE]     4 --&gt; 3[IMAGE PROCESSING CENTER]     4 --&gt; 5[MONITOR]           </pre> </div> <b>(57) Abstract</b> <p>A fully integrated, electronic imaging system that allows a user to take pictures with an electronic camera (2), and to readily display, store, select, annotate and/or forward the resulting images to a remote facility for the processing of desired prints and/or other media for displaying the acquired images includes three major components comprising a device for electronically acquiring images and storing the acquired images, an image processing center (3) which receives the acquired images in an electronic format and which arranges for processing of the received images, and an interfacing device (3) for operatively connecting the acquiring device and the image processing center (3).</p>		

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SYSTEM AND METHOD FOR TAKING, SELECTING  
AND PROCESSING ELECTRONIC PICTURES

Cross-Reference to Related Application

This patent application claims the benefit of prior filed, co-pending U.S. Provisional Application No. 60/109,549, filed on November 23, 1998, the subject matter  
5 of which is incorporated by reference as if fully set forth herein.

Background of the Invention

The present invention relates generally to the field of electronic photography, and more particularly, to  
10 the processing of photographic images obtained using an electronic (so-called "digital") camera.

A variety of electronic cameras have recently come into use, and such use is increasing in popularity and penetration. An important reason for this is the more  
15 recent development of electronic cameras that, unlike their earlier counterparts, can produce images that approach the quality of conventional film (e.g., 35 mm) cameras. These advancements have contributed to a fundamental shift in the photography industry, away from the use of negative films,  
20 conventional cameras and film photofinishers and toward electronic cameras that no longer require the use of film (thus eliminating the limitations imposed by film media, especially the need to have adequate supplies of film on hand).

25 This shift has caused a corresponding shift in the infrastructure established for processing photographic images. As an example, the processing of photographic images acquired using conventional films has traditionally been accomplished by removing the film from the camera after

the desired images have been captured on the negative film media, and by delivering the film to a selected photofinisher. Often this is done by physically carrying the film to a local photofinisher. More recently, this has come to be done by sending the film to a remotely located, centralized photofinisher, by mail or using a courier service. In any event, the options available for having film developed are limited by the medium itself, which must be physically transferred to the photofinishing facility.

Images acquired electronically are not subject to such limitations, and are capable of being transferred to a local or remote facility electronically. This has led to the development of a variety of systems for enabling the electronic transmission of acquired images (i.e., the electronically acquired images) to a photofinisher without actually having to physically convey the image-bearing media to the photofinisher. Many such systems have been developed, including a variety of telephone-based systems, and a number of systems which are capable of operating over the Internet to take advantage of the versatility of this ubiquitous network.

In practice, these systems exhibit certain complexities which have tended to limit their widespread use by the general public. For example, some systems are configured for use with a particular electronic camera, or a particular media for receiving the acquired images. Some systems are configured for use with a particular electronic image transmitting infrastructure, often to intentionally require the exclusive use of a particular service. However, irrespective of how configured, such systems generally exhibit the following two overall limitations.

First, such systems generally require the use of a computer (i.e., a personal computer or "P.C.") to achieve their desired functions. Software residing in the P.C. is used to download the data which corresponds to the acquired images from the electronic camera, and to format the

downloaded data for transmission to the photofinisher (e.g., via the Internet). However, this requires the user to have some facility with computers, which can often unacceptably limit the use of such equipment by the general consumer.

5               Second, such systems generally require the use of a series of diverse system components to achieve their desired functions. In addition to the complexities of the digital cameras themselves, this can include the need for adapters capable of interfacing the particular digital  
10 camera which is used to the particular software residing in the receiving P.C., and for interfacing the software residing in the P.C. with the downstream facilities necessary for communicating with the photofinisher. Moreover, different adapters are often required to couple  
15 the components of different manufacturers and service providers. Such complexity can again often unacceptably limit the use of such equipment by the general consumer.

              Accordingly, it is a primary object of the present invention to provide a system for obtaining the  
20 photofinishing of electronically acquired images which is convenient to use and which is fully integrated for simplicity of use.

              It is also an object of the present invention to provide a convenient, fully integrated system for obtaining  
25 the photofinishing of electronically acquired images which is not subject to the need for diverse, often incompatible operative system components.

              It is also an object of the present invention to provide a convenient, fully integrated system for obtaining  
30 the photofinishing of electronically acquired images which does not require the use of complicated system components such as a computer.

#### Summary of the Invention

These and other objects which will be apparent are

achieved in accordance with the present invention by providing a fully integrated, electronic imaging system that allows a user to take pictures with an electronic (digital) camera and readily display, store, select, annotate and/or forward the resulting images to a remote facility for the processing of desired prints and/or other media for displaying the acquired images (e.g., on a television, monitor, computer screen or other display responsive to images stored in memory, including floppy disk and compact disk formats), without the need for a personal computer.

The resulting system initiates a fundamental shift in the photofinishing market, away from negative films and the use of conventional cameras and film photofinishers, to the use of electronic media for acquiring photographic images. To this end, the system of the present invention operates to allow users to interactively enjoy photographic images, and to communicate electronically through existing networks. The resulting communications permit a more rapid and convenient transfer of images while maintaining the quality of conventional 35 mm (film) photographs.

The system of the present invention is interactive and allows the user to instantly preview, store, annotate and forward images to a photofinisher capable of producing photographic images either by conventional (so-called "wet") processes or by storing the images in memory (on appropriate electronic storage media such as floppy disks and compact disks). This has the further advantage of facilitating the electronic transfer of such images to others (either by scanning the photographic prints or by sending files derived from the storage media), including the transfer of such images by electronic mail and the Internet.

The images can be produced in any of a variety of desired formats including the more traditional 35 mm photographs and/or as electronically displayed image (e.g., on a television, a monitor, a computer screen or a preview display). While the system of the present invention can

interface with computers, if desired, the use of a computer is not an operational requirement of the system. As a result, it is no longer necessary to use a P.C. to enjoy electronic photography, simplifying the media for the  
5 general consumer.

### Brief Description of the Drawings

Figure 1 is a block diagram showing an overview of the system of the present invention.

Figure 2 is a block diagram showing an overview of  
10 the components of the interfacing device shown in Figure 1.

Figure 3 is a block diagram showing an overview of the components of the image processing center shown in Figure 1.

Figure 4 is a block diagram showing an overview of  
15 the software components used to implement the image processing center shown in Figure 3.

Figure 5 is a block diagram showing operations of the image processing center shown in Figure 3 using the software components shown in Figure 4.

### 20 Detailed Description of a Preferred Embodiment

Referring to Figure 1, the system 1 of the present invention is generally comprised of three major components including an image acquiring device 2 (such as a camera for acquiring images and having electronic memory for storing  
25 the acquired images), an image processing center 3 which receives the acquired images in an electronic format and which arranges for processing of the received images (e.g., to "develop" the electronically formatted images by producing prints of the images or by applying the images to  
30 an electronic storage medium which can be viewed on a monitor), and an interfacing device 4 for operatively connecting the image acquiring device 2 and the image

processing center 3. These several system components combine to provide an image processing service which can be fully integrated in terms of its functionality, from the initial acquisition of images to the final delivery of prints and/or electronic reproductions.

The image acquiring device 2 is preferably implemented as a filmless, electronic still camera. Any of a variety of available devices may be used for this, including any of the so-called "digital" cameras which are presently in common use. The camera which is selected for use can either have internal features which allow the user to preview images prior to their storage and/or transmission to the image processing center 3, or this process can be performed using the interfacing device 4, as will be discussed more fully below.

The selected camera is preferably a modular unit comprised of conventionally available elements which can easily be upgraded to provide additional functions or to incorporate new components which might later become available (e.g., faster processors, higher resolution displays, larger capacity memory, etc.). To this end, the camera will preferably include system components for acquiring electronic images, for displaying images in an electronic format, for storing the acquired images, and for communicating the images to a receiving unit. These systems are preferably incorporated into a suitable mechanical shell (i.e., a casing), together with an appropriate operating system and power system for the camera.

Image acquisition is preferably accomplished using a color sensor module which is based on a charge-coupled device (e.g., a 640x480, 24-bit color CCD), coupled with an appropriate CCD driver for providing suitable timing and registration. An associated exposure module preferably includes a strobe (for flash photography), a corresponding shutter and driver, and appropriate photometry and ranging circuitry. An associated optics module preferably includes



a fixed-focus lens coupled with an anti-aliasing filter. An associated control module preferably includes a frame buffer, a real-time clock and oscillator for developing system timing functions, analog-to-digital (A/D) and digital-to-analog (D/A) conversion, memory for storing the operating system (system ROM) and an overseeing controller (e.g., an ARM ASIC controller). An associated signal processing module preferably includes VSP, A/D, DSP, D/A components and registers for achieving an appropriate image compression ratio (e.g., an 8:1 compression ratio in a JPEG format).

Image display is preferably accomplished using a high resolution, 4-inch diagonal, liquid crystal display module which is coupled with appropriate controller electronics for producing the desired images. Image storage is preferably accomplished in resident memory, or using a PCMCIA storage module or flash card (e.g., a removable, re-writable card having a minimum capacity of 2 MB), coupled with appropriate controller electronics. Image communications is preferably accomplished using a high-speed, synchronous modem (e.g., operating at 56 Kbps), which can have built-in telephone functionality (i.e., a microphone and speaker) if desired.

The image operating system associated with the camera is preferably implemented by command function software (in ROM) including the functionality of image file and color management, communications management and power management. An appropriate power conversion module is provided for operating the resulting unit, preferably using battery power for portability.

The foregoing functionality may be implemented using any of a variety of known system components, which can freely vary with the type of camera which is selected for a particular application.

In operation, the image acquiring device 2 permits the user to "take pictures" in conventional fashion,

including basic point-and-shoot photography as well as more advanced photography, depending on the particular camera which is used. If desired, the camera can include a display for previewing the acquired images (e.g., the previously mentioned 4-inch diagonal, built-in color LCD display), as well as electronic means for annotating and storing the acquired images. The camera can either be a basic camera, with limited control functions and special features, or a more advanced camera having any of a variety of pre-programmed imaging applications such as voice and/or text annotation of the images, incorporation of the images into compound documents, the creation of specialty borders, and functions for facilitating the transmission of image to other devices for viewing (e.g., another camera, a remote computer, a television monitor and/or a photofinishing facility).

To provide relatively simple operations (for making the camera as "user friendly" as is possible), a simplified command set can be developed. For example, the necessary operations can be implemented with only two basic command buttons including one button for taking pictures (i.e., providing a point-and-shoot operation which electronically and automatically adjusts for all exposure settings) and another button for electronically transferring the acquired images from the memory associated with the camera to the image processing center, as will be discussed more fully below.

Alternatively, more elaborate operations can be offered by replacing the image-transmitting button with plural buttons capable of controlling any of variety of functions, or a micromouse that can be used to access a menu of instructions (e.g., displayed on a built-in monitor associated with the camera). Such functionality can include the ability to preview the images which have been acquired (either a newly acquired image or a previously acquired image saved in memory), to store (save) acquired images, to

access desired operator-controlled features (e.g., the application of holiday or occasion borders, text annotations and image overlays to the acquired images, or for purposes of archiving), to select output modalities (e.g., to format  
5 the images as 35 mm quality photographs, or to deliver the images to a remotely located display such as a computer monitor or a television) or to identify a particular recipient for the acquired images (e.g., from a user-generated "address book" which can be displayed on the  
10 camera's built-in monitor). If desired, the accompanying instructions can be sent to the image processing center 3 together with the transmitted images.

The camera can also be used to provide the user with interactive imaging features, if desired. For example,  
15 the user's archived pictures can be accessed either locally, from memory resident in the camera, or remotely, from archives stored in a central (preferably secured) facility, such as the image processing center 3. The images can be organized according to the user's specifications, and can be  
20 recalled and displayed on the built-in monitor of the user's camera, if available.

The camera (or the interfacing device to be described below) can also be configured to allow one or more users to call one another, have a conversation and exchange  
25 images. This, in essence, allows the camera to operate as an interactive picture phone. The user can simply access the personalized address book associated with the camera and click on the desired address to "call" another user, allowing the users to converse and exchange images in real  
30 time.

As previously indicated, the image acquiring device 2 can be directly connected with the image processing center 3. This can be accomplished with a simple (e.g., cable, infrared or radio frequency) connection to a standard  
35 telephone jack, to a distributed cable system or by transmissions accomplished through cellular communications.

Alternatively, the image acquiring device 2 can communicate with the image processing center 3 using the interfacing device 4 to facilitate the communications with the image processing center 3. In such case, communications with the image processing center 3 are again preferably implemented using a telephone-based connection (e.g., a land line or through a wireless connection) or a distributed cable system, to take advantage of the ready availability of existing networks.

10           The interfacing device 4, if used, is preferably implemented as an integrated unit for receiving data from the image acquiring device 2, and for forwarding the received data on to the image processing center 3 for appropriate handling. The interfacing device 4 is further  
15           preferably associated with a monitor 5 for displaying the acquired images. The interfacing device 4 is preferably kept simple in operation, requiring minimal and preferably conventional electrical connections, and is preferably automated to the extent possible in terms of its overall  
20           operations. Remote controlled operations can be used, if desired, including the use of voice-actuated systems.

          An example of an interfacing device which can be used to provide such operation is available with reference to U.S. Provisional Application No. 60/128,592, filed April  
25           9, 1999, and entitled "Video Image Processing", which discloses a cassette adapter which can be mated with a conventional video cassette recorder (VCR) to interface with the image acquiring device 2 using an otherwise conventional VCR. The VCR can then be used to display acquired images,  
30           to facilitate the selection of prints (or other items) to be ordered, and to format the acquired data for transmission to the image processing center 3. Alternatively, the interfacing device 4 can be implemented as a "docking station" for receiving the image acquiring device 2 and for  
35           automatically establishing any necessary operative connections.

Another example of an interfacing device 10 which can be used to provide similar operations, including the potential for remote-controlled operation, is shown in Figure 2. The interfacing device 10 includes an

5 input/output (I/O) device 11 for receiving signals from the image acquiring device 2. The I/O device 11 can either be configured to receive data directly from the image acquiring device 2, or can be implemented as a memory card reader for receiving a memory card bearing data from the image

10 acquiring device 2. A video and audio module 12 is coupled with the I/O device 11 and provides an output for displaying images on the monitor 5. A remote control receiver 13 is preferably coupled with the video and audio module 12, for operation with a remote control transmitter 14 to permit

15 remote controlled operation of the interfacing device 10. A modem 15 is coupled with the video and audio module 12 and is capable of communicating with the image processing center 3 via an existing telephone network. A processor 16 operates in conjunction with sufficient memory 17 for

20 storing the acquired images, and is coupled with the I/O device 11, the video and audio module 12, the remote control receiver 13 and the modem 15 (preferably through standard interfaces, with the exception of the remote control receiver 13, which preferably uses serial port

25 communications) to control the operations of these components as follows.

In overall operation, the monitor 5 and the remote control transmitter 14 provide communication between the user and the interfacing device 10. The monitor 5 displays

30 signals from the interfacing device 10, and the remote control transmitter 14 sends signals from the user to the interfacing device 10. Each device need only provide communication in a single direction.

The processor 16 then operates to interpret the

35 received data, preferably with a user interface which employs a plurality of "screens" (to be described below)

provided for the convenience of the user. The screens are shown on the monitor 5; and the user is prompted to press buttons on the remote control transmitter 14 to achieve the functions which are needed to place a desired order.

- 5 Subsequent screens shown to the user will depend on the buttons pressed by the user. If the user presses an incorrect button relative to the inquiry being made, the user can either be prompted with an error message or the previous screen can remain on the monitor until an  
10 appropriate selection has been made.

The remote control transmitter 14 is preferably implemented using a known ("universal") infrared (IR) remote control device, and a corresponding receiver 13 coupled with the serial port of the processor 16. Since it is  
15 one-directional, serial port configuration does not require a conventional hand shake and therefore need not comply with an RS-232 protocol.

Known "universal" remote control devices are programmed to operate on a specified (numbered) code for the  
20 buttons on the remote control transmitter. These codes can be changed, as needed, to interface with any of a variety of different devices, including many known monitors, TV's and VCR's. The transmitted signals are preferably sent by the remote control transmitter 14 in the form of a serial stream  
25 (e.g., using a 19 kHz or a 38 kHz carrier). The data stream is preferably 100% amplitude modulated by an impulse function, with the short impulse being a logic "0" and with the long impulse being a logic "1".

These impulses are sensed by the corresponding  
30 (IR) receiver 13. The sensed impulses are preferably brought to a standard (RS-232) voltage level of  $\pm 10V$ , and are then sent to a universal asynchronous receiver-transmitter (UART 18) which is preferably located on the board which carries the processor 16 and which  
35 preferably operates through a standard serial port connector.

UART 18 interprets the series of pulses (in the preferred embodiment, a series of eight pulses) as one byte having an eight-bit length. It is presently considered to be unnecessary to attach any start or stop bits to this byte. Each push of a button generates two (or more) streams of eight bytes each, followed by a stream of zeros. The software associated with the IR driver then operates to eliminate the zeros and decode the button which has been pushed, based on information stored in a look-up file. UART 18 preferably operates continuously (since the information can be needed at any time and since no means are provided for generating a wake-up request in one-directional communications). As an alternative, the software can operate in a mode which periodically polls for codes resulting from a depressed button, or for the codes associated with the depression of specific buttons calling for specific actions such as "power-up", "reset", "power off", "sleep" and "wake-up" modes, among others. To avoid using old information, the implementing software preferably operates based only on the latest inputs generated.

The image processing center 3 is a centralized facility which can manage all aspects of the overall process (e.g., image routing, archiving, applications, billing, etc.), including any downstream photofinishing services that have been requested. This can include photofinishing by the image processing center itself, or by available "quick-print" franchises which are configured for mail-order delivery of finished photographs and image-bearing media.

The general purpose of the image processing center 3 is to collect, sort, process and forward the images received from users' cameras, as well as other subscriber sources such as personal computers. Once received, the image processing center 3 will first sort the images for processing and then forward the sorted images to any of a number of available systems for posting the printed images (e.g., another camera, a computer, a monitor, a printer or a

photofinisher)). If desired, the image processing center 3 can also operate to facilitate access to "value-added" services such as "online" image communications, color management access, archival storage and image enhancement services (for which the customer can be incrementally billed). In overall function, the image processing center 3 receives inbound image transmissions from the subscribing customers, bills the user for the services which have been requested, and routes the image files (as defined by the user) to the photofinishing facility or other user-defined location (for viewing and/or processing). To prevent unwarranted access, the user's image files are preferably secured. To this end, such files are preferably double encrypted, with one level of encryption being under the control of the image processing center 3 and with another level of encryption being responsive to a customer-defined password.

Figure 3 shows a preferred architecture for the image processing center 3, which is generally comprised of a telecommunications front end processor (FEP) 20, a central processor 21, a disk/tape drive 22, a write once read many (WORM) optical disk drive 23, digital and analog high speed modems 24a, 24b, P.C. work stations 25 and a terminal 26 for establishing telephone-based communications (e.g., using a "PBX-CENTREX" service).

The telecommunications front end processor (FEP) 20 is preferably implemented with an IBM 3745 unit. The functions of the FEP 20 include management of the network (including functions such as sorting, voice and image data recognition, optimization and billing), the performance of error correction, and buffering of the image files before the image files are forwarded to the central processor 21. As an example of the capacity anticipated for the FEP 20, a basic unit should be able to store and forward a peak load of at least 130,000 images in one hour (both inbound and outbound) for a configuration having 250 inbound and 250



outbound (e.g., 56 Kbps) ports and 4 outbound (e.g., 2 Mbps) ports.

The files to be handled by the FEP 20 will generally be of a larger size, and will therefore require a significant amount of disk storage. However, these demands can be met by selecting an appropriate operating system, such as the IBM MVS-XA operating system and associated data base management software, which is capable of providing significant stability while avoiding the need for software system conversions as the size (and capacity) of the overall system increases.

The central processor 21 is preferably implemented with an IBM 3090-20E unit. The central processor 21 preferably has a capacity capable of accommodating up to 100,000 subscribers, transacting 100 images per month. The functions of the central processor 21 include decryption, the processing of applications, and the switching of image transactions from the FEP 20 to the disk/tape drive 22 for archiving, back-up and/or switching of the images to user defined locations.

The disk drives of the disk/tape drive 22 are preferably implemented as IBM 3380 K type drives. To maximize quality control and to allow for the possibility of additional customer requests following an initial transaction, the temporary storage of all image files is preferred. Storage for a limited time period (e.g., three days) will allow the customer to place special order requests if later desired. Longer term storage can also be provided, if desired, although a separate (long-term) storage unit would preferably be used for such purposes to avoid unacceptable loading of the overall system. The storage capacity of the disk drives can be scaled up or down, based on customer requirements, with a loading of the drives to a 50% capacity being preferred for optimum performance (e.g., a single drive loaded at 50% will yield 3.75 gigabytes of storage, while a string of four drives

will yield 15 gigabytes of storage). The tape drives of the disk/tape drive 22 are preferably implemented as IBM 3480 type A/B 22 units, which are cartridge tape drives and which are used to provide tape back-up of the system on a  
5 prescribed (e.g., daily) basis.

The WORM drive 23 is preferably implemented with plural, Sony WDA-710 jukebox units, and is used for the permanent archiving of images. Each jukebox preferably has a capacity on the order of 500 gigabytes, permitting an  
10 archiving of about 4,000,000 images. The respective units can be configured to provide back-up for one another, if desired.

The high-speed analog modems 24a are preferably implemented with AT&T Paradyne 56 Kbps synchronous analog  
15 modems, connected to the public switched network, and are used to receive the images sent to the FEP 20 by users (subscribers) of the system. The high-speed digital modems are preferably implemented with AT&T T-1 multipoint modem/multiplexers, and are used to transmit image files  
20 outbound to the photofinisher. A preferred complement of modems 24a, 24b would include, as an example, 4 digital T-1 modems combined with 500 analog modems (including 250 inbound and 250 outbound, high-speed analog modems) to provide a sufficient online capacity for about 6,000 online  
25 customers per day (with an anticipated rate of less than 1% busy calls, given a normal pattern of expected calling). A series of 16 T-1 modem/multiplexers will provide the capacity to handle about 122,000 customers (assuming an average photofinishing transaction rate of 1 image per  
30 customer per day).

The PBX-CENTREX service used by the terminal 26 is an available service which is used for purposes of administration, sales and customer assistance functions. As an example, for an anticipated capacity of 100 calls per  
35 hour, a series of 40 dedicated "help desk" P.C.'s and terminals should perform satisfactorily.

To provide the end services of photofinishing, any of a number of existing service providers can be used, either exclusively or in desired combinations. This can include services using any of a variety of finishing modes which are presently conventionally used for the processing of traditional photographic prints, as well as dye sublimation printers, compound color laser copiers, wax thermal printers, ink jet and electronic film recorders, or equivalent technologies that may come to be used in the future.

For example, a Sony UP D8800 unit can be used to generate a photographic quality A4 print, and is especially useful for applications that require high quality photo-realistic prints, including desktop publishing and pre-press proofing. A Management Graphics, Sapphire Image Recorder can be used for applications where customers are interested in receiving traditional 35 mm photographic prints because such units are capable of exposing the film-producing images at an extremely high resolution (e.g., a minimum acceptable input resolution of 2000x1500 pixels). For those electronic images having a lesser resolution, automatic interpolation of the image can be performed to yield the higher resolution output file which is required. Internal look-up tables can be used to provide color-calibrated colors for most popular professional and standard films (e.g., from Kodak, Fuji, AGFA and Konica). The Sapphire Image Recorder can also be used to image Kodak PhotoCD files, if desired.

A system having the foregoing architecture can service users in diverse locations, to forward images to any of a number of diversely located image processing centers, or if desired, the system can be deployed at a single site (e.g., in a resort or hotel environment) to receive images from users located at that site. As an example, a system having the latter configuration has been deployed for received images produced using conventional digital cameras,

which were then stored on SmartMedia cards. The cards were then inserted into card readers, which were mated with P.C.'s (for purposes of testing only). The P.C.'s were each provided with a software system 30 having the architecture shown in Figure 4, operating in conjunction with an image processing center 3 having the architecture shown in Figure 5 and generally including a network server 41, an operations P.C. 42 and a printer server 43.

The user P.C.'s were connected to the network server 41 through the conventional telephone network using 56 kbps (V.90) modems, providing two-way communications, for sending files to the network server 41. The files received from the different users were then buffered in the network server 41, before being called by the printer server 43 for image printing, and by the operations P.C. 42 for other processing (e.g., for floppy disk or CD recording). The received files were also backed up, into 2 GB disks, where the files were kept for a 30-day archiving period before being discarded. A 10BaseT Ethernet LAN was employed (which would also permit access to an Internet network, if desired), in combination with a distributed software system residing on plural hosts communicating over the telephone and local area networks.

For purposes of the following description, it is assumed that the network server 41 is a master-to-host P.C., meaning that all programs and their updates will be loaded remotely from the network server 41 unless this is not practical. The software system 30 is preferably modular so that the software can be quickly adapted to changes in overall system requirements and system implementations. To this end, the software system 30 incorporates the following six, interconnected programs.

An order managing program 31 is provided to retrieve an order header file 32 (from a listing maintained on the system's users) and the images 33 to be printed and/or recorded. The order managing program 31 first checks

for errors, and then creates an input data file (for use by a billing program 35 which will be described below) and two files which are sent to an order display program 34 (to be described below), one for printing and one for recording.

- 5 The latter two files include names for the images selected for printing and for recording, respectively. The order header is a text file that is generated by the user P.C., and which is formatted as follows:

```

10  -----file begin-----
    ORDERHEADER_BEGIN
    USERINFO_BEGIN
    user information contents
    USERINFO_END
    ORDERLIST_BEGIN
15  order list contents
    ORDERLIST_END
    PRICELIST_BEGIN
    price list contents
    PRICELIST_END
20  BILL_BEGIN
    bill contents
    BILL_END
    ORDERHEADER_END
    -----file end-----

```

- 25 "USERINFO" can include information such as the date, time, user identification number, user name, password, number of pictures, etc.

- "ORDERLIST" is organized in a listing format, and requests a list of pictures to be processed. For example, 30 for prints, the ORDERLIST can include information such as size, type and number. For floppy recordings and CD recordings, ORDERLIST can further include a list of picture names. Other information can be requested for other media, such as postcards (background or frame type), T-shirts and 35 sweatshirts (size, color) and cups and plates (size).

- "PRICELIST" is extracted from a file that is entered by a pricing program 36 (to be described below), and operates to correlate pricing for the ordered items to the pricing shown to the user by the user P.C.

- 40 "BILL" is extracted from the billing program 35 (that resides on the user's P.C.), for providing the user

with an on-screen bill as the order is placed. The presentation of an on-screen bill is optional, but if presented, the on-screen bill should be the same as, or compatible with, the rendered bill which is later presented to the user by the billing program 35.

The order managing program 31 produces three output files. Two output files are prepared for the order display program 34 (a record order and a print order), and preferably include two fields from the order header (USERINFO and ORDERLIST). The third output file is passed to the billing program 35, preferably in its entirety.

An order display program 34 is provided to display the print order and/or record order files in a form which can be understood by the end-user. The displayed files are also used by the user P.C. and by the printer server to download the selected user image files and to automatically record and print the selected files. The resulting files can also be used to generate labels for the envelopes which will subsequently be used to ship the selected orders (i.e., prints, storage media or hard goods).

The inputs for the order display program 34 include the previously mentioned print order and/or record order files. The output files from the order display program 34 are provided to the user, as screen outputs. Two such screen outputs are provided including one for print orders and the other for recording orders (i.e., floppy disk/CD orders).

A billing program 35 is provided to generate a summary of the amounts to be charged to the end-users, preferably as bills generated for a desired time interval (e.g., daily, weekly, monthly) which is appropriate for the particular application being implemented (e.g., home use, resort use, etc.). To this end, the billing program 35 generates output files for generating user bills, and an invoice for attachment to the order for tracking purposes. The billing program 35 also keeps a current list of system

users; and communicates with the financial reports program 37 and the statistics program 38 (to be described below).

Inputs for the billing program 35 include two files, from the pricing program 36 (to deliver current price lists to the billing program 35) and from the order managing program 31, and keyboard instructions received from a system operator. The outputs from the billing program 35 include two printouts and two files.

One of the printouts is for the user, providing information such as the date and time of the transaction, the name and address of the user, the relevant charges, the total number of pictures ordered, unit pricing and related charges, and the total charges incurred. Data from the order managing program 31 is preferably used to generate this printout. Data from the pricing program 36 can also be used to generate this printout, if desired. The other printout is for the service provider (e.g., the image processing center 3), providing information such as the date and time of the transaction, the name and address of the user, the relevant charges, the promised delivery time, if offered, the content of the order, the total charges for the user, and grand total information.

One of the files from the billing program 35 is output to the financial reports program 37, and corresponds in content to the printout for the service provider. The other file is output to the statistics program 38, and corresponds to the printout given to the user.

A pricing program 36 is provided for the system operator to access (and modify) the current pricing for the various products and services being offered (from the keyboard). The pricing program 36 generates one output file that is used by the user P.C.'s and by the billing program 35. The user P.C.'s use the file received from the pricing program 36 to modify the appropriate fields associated with the user's displays, and to calculate and display the user's current billing information. The billing program 35 uses

the file received from the pricing program 36 to provide corresponding data to the billing program 35 (for generating a hard copy of the user's bill). The billing program 35 also uses the file as a back-up, and for comparison with the  
5 billing information associated with the order header.

Inputs for the pricing program 36 come from the operator's keyboard, and the operator is preferably prompted to enter the appropriate information. The outputs from the pricing program 36 are routed to two destinations, including  
10 a price list file which is routed to the user (including information such as the date and unit charges), and a corresponding file which is sent to the billing program 35 (as previously mentioned).

A financial reports program 37 is provided to  
15 generate a summary of the financial results achieved by the system (for a specified period). Inputs for the financial reports program 37 are received from the billing program 35, as previously described, and from the keyboard. The financial reports program 37 then operates to compare total  
20 charges against collected receipts, and total account receivables are calculated. The financial reports program 37 can be used to produce (output) any of a variety of reports, to the operator's screen or as printouts, such as total charges (per day, week, etc.), total losses (per day,  
25 week, etc.), total accumulated charges, total accumulated losses, total accumulated cash received, total accounts receivable (total accumulated charges, accumulated cash received) and total accumulated charges less total accumulated losses, or other reports deemed useful for the  
30 image processing center 3.

A statistics program 38 is provided to gather data for generating statistical reports and marketing research for the system. Inputs for the statistics program 38 are received from the billing program 35, for output as an  
35 organized, graphical display of the received data.

The operative environment for the software system



30 is shown in Figure 5. In this configuration, orders arrive at the network server 41, where they are buffered and organized into desired files and directories (e.g., by date and by user). These files and directories can be organized to hold all user orders for a given day (or other prescribed period) or to hold all orders for a given user, as desired. The following routine is then preferably run on a short-term periodic basis (preferably daily):

- 1) Run order managing program
- 10 2) Print daily check list
- 3) Record picture bearing CD's, print CD labels, and fasten labels to CD's
- 4) Print ordered pictures, postcards and label/invoice sheets
- 15 5) Fasten backs to postcards, for postcard orders
- 6) Insert CD's into CD cardboard pockets and combine with pictures, postcards and label/invoice sheets in envelopes for respective users
- 7) Check order on the daily check list
- 20 8) Print billing for service provider
- 9) Generate daily statistical reports
- 10) Backup all daily directories (on the network server)
- 11) Archive the user directories (on the network server)
- 25

The following routine is preferably run on a long-term periodic basis (responsive to the needs of the service provider).

- 1) Change the price list
  - 30 2) Generate periodical statistical results
- The following routine is preferably run on an as-needed basis.

- 1) Record picture CD's for a prescribed period responsive to user activity (e.g., guest stay at a resort)
- 35 2) Query the last-entered user name for a given user
- 3) Answer user inquiries

Running the order managing program 31 operates to process the daily orders and create log files for

- 40 "processed" and "rejected" orders. This is followed by the background parsing of orders to record order, print order and billing files (including user invoices, daily bills and statistical files).

Printing of the daily check list also operates as a reminder to place all ordered items in their corresponding envelopes. The operator can then check the generated list to verify that all placed orders have been completed.

5           Recording of the picture bearing CD's, printing of the CD labels, and fastening of the labels to the CD's causes the files to be recorded to a particular CD to also be copied to the working directory (from the network server 41). The files are then automatically moved to a "record  
10 field orders" directory after the recording is completed. The record field orders directory is a short-term (preferably daily) directory that stores all processed CD orders. Completed orders are automatically deleted from the dialog box display, or are moved to storage, as preferred.  
15 A label is printed in conjunction with these operations, preferably by automatically drawing the proper name from the user's data file to help minimize typing mistakes. A confirmation number is preferably applied to each label which is unique to the particular order.

20           Printing of the ordered pictures, postcards and label/invoice sheets causes the files for the ordered prints and/or postcards to be copied to the working directory from the network server 41. In addition, the invoice/label sheet is copied from the billing program 31 and is automatically  
25 matched with the order. Three separate working subdirectories are preferably formed to perform this operation. The print and postcard files are automatically moved to a "print field orders" directory after the recording is completed. The print field orders directory is  
30 a daily directory capable of storing all processed print and postcard orders. These processes are preferably automated so that desired batch jobs can be run unattended, if desired.

35           A computer program listing for performing the foregoing operations is attached hereto as Appendix A. In conjunction with the listed operations, selected formatting

and options are preferably coded using hexadecimal numbers (preferably as 32-bit words), with all formats requiring wet processing (e.g., prints) using the lower 16 bits and with all other formats using the upper 16 bits. The pricing between formats will generally be different, while the pricing within a given format will generally be uniform. These formats are mutually exclusive, but each format can have several options, if desired.

The following description is provided to illustrate an application of the foregoing system components, and is given in the context of a network (the previously described test network) associated with a resort facility to provide guests at the resort with the ability to acquire electronic images and to arrange for photofinishing of the acquired images from their rooms. It is to be understood that this example is provided only for purposes of illustration and that any of a variety of networks may similarly be implemented for use in providing different applications and settings.

In this illustrative application, electronic images were acquired using a suitable digital camera. Following this, the system was activated and a series of informational "screens" were provided to guide the user (i.e., the guest) through the required steps, with or without corresponding audio hails or prompts.

Initially, this can include one or more informational screens, to introduce the guest to the system or to provide a system overview. Bypass commands can be given to allow the system to be advanced to a subsequent stage in the process, if desired. Following this, prompts are provided to allow the guest to access the system (i.e., a "sign-in" procedure requesting a name, room number, PIN number, or some other appropriate form of identification). This information is then used to establish the previously mentioned order header for the transaction, including the necessary "GUEST\_NAME" and "GUEST\_STATUS" fields.

The system, once accessed, then operates to guide the guest through the steps necessary to view, select and order desired services and products (e.g., prints, diskettes, CD's, hard goods, etc.). The data (i.e., the acquired images) stored in memory in the digital camera is preferably automatically accessed, transferred to the system, and temporarily stored (by the interfacing device 4) during these initial steps. The memory associated with the digital camera can either be automatically purged or retained during this transfer, either according to a pre-programmed schedule or responsive to the requested action selected by the guest (responsive to a suitable prompt).

Suitable messages (audio and/or video) can be supplied to the guest during these, or other steps in the process in those cases where errors have been detected (e.g., related to use of the system, to the guest's identification, etc.), preferably informing the guest how to correct the error or how to obtain assistance (e.g., telephone assistance from a "help desk"). Desired invoicing (for the guest, for the resort or for the service provider) can also be supplied at this, or any other step in the overall process, as desired.

The downloaded images are then made available for viewing by the guest. This can be done in a variety of different ways including accessing the various images by number, responsive to an input received from the guest, or by an automated showing of the images to the guest (i.e., a "slide show" of the acquired images). The automated showing, if used, can be implemented as a full-sized reproduction of a selected number of images (e.g., five or six 4x6 images) or as a reduced-size reproduction of a larger number of images (e.g., as "thumbnail" views). As the images are displayed, each image can be selected, rejected or applied to different media, as desired.

In conjunction with display of the acquired

images, a series of command options are provided for ordering goods and services. This can be implemented using push-button controls, menus or icons associated with the display screen, as preferred. This can include commands for  
5 selecting the images to be applied to prints, postcards, diskettes, CD's, other fixed media, as well as hard goods such as mugs, T-shirts, match books, etc., as well as overall commands for placing, amending or cancelling an order. Different options and/or screens can be provided  
10 responsive to a selection which is made, to ensure that the guest provides all of the information which is needed for a given product or service (e.g., size, number and finishing for prints, type of postcard or storage media for receiving selected images, number and size for ordered hard goods,  
15 text for application to an ordered item, etc.). This can also include commands for facilitating the viewing of images such as allowing for rotations or other movements of the displayed images, scrolling functions, cursor/mouse functions, etc.

20 Invoicing information can be supplied in conjunction with an order at any desired stage, either as a separate screen or as a partial screen incorporated into or overlaid upon the current screen being viewed by the guest. This can be used to provide the guest with an indication of  
25 costs associated with a particular order, an interim bill, or a final bill, which can be controlled responsive to commands produced by the guest, by the resort or by the service provider.

Upon the completion of an order, a command is  
30 provided for use in accepting the selections made. A confirmation number is preferably assigned to the order and displayed for the guest. The data (images and selections) for implementing the order is then automatically forwarded to the photofinishing facility, and following completion of  
35 the order, the items are either delivered to the guest's room, or forwarded to some other address entered by the

quest in conjunction with the placed order. The result is a fully integrated system for obtaining goods and services, from the acquisition of images to the placement and filling of orders.

5 All of the foregoing operations can be implemented by simple wire and/or cable connections, radio frequency (RF) or infra-red (IR) transfers, or memory card insertions into existing equipment, for establishing communications over any of a variety of data communicating networks  
10 including wired (land-line) telephone networks, distributed cable systems, and wireless transmission networks. Although one-way communications are discussed in the foregoing description, two-way communications can also be used to provide additional functionality. For example, using  
15 two-way communications allows finished product (in electronic format) to be returned through the system of the present invention to the user initiating the order, or to some other destination designated by the user, if desired. To be noted is that a computer need not be used to achieve  
20 the foregoing functionality, although a computer can be used with the system of the present invention, if desired (for example, as in the previously described test system).

It will be understood that various changes in the details, materials and arrangement of parts which have been  
25 herein described and illustrated in order to explain the nature of this invention may be made by those skilled in the art within the principle and scope of the invention as expressed in the following claims.

Claims

What is claimed is:

1. A method for processing electronically acquired images, comprising the steps of:

5 capturing a plurality of the images using an electronic camera, and storing data corresponding to the captured images in memory associated with the electronic camera, thereby acquiring the plurality of images;

10 transferring the stored data corresponding to the acquired images to an interfacing device for communicating with a central processing facility;

displaying the acquired images on a monitor coupled with the interfacing device so that each of the acquired images can be viewed on the monitor;

15 selecting between the acquired images displayed on the monitor and designating acquired images for further processing, using the interfacing device;

20 transferring the stored data corresponding to the designated images from the interfacing device to the central processing facility; and

processing the stored data corresponding to the designated images at the central processing facility.

25 2. The method of claim 1 wherein the interfacing device and the monitor are coupled with the electronic camera, and which further includes the step of using controls coupled with the camera for the selecting and the transferring.

30 3. The method of claim 2 which further includes the step of directly transferring the data for the designated images from the electronic camera to the central processing facility over a data-communicating network.

4. The method of claim 1 wherein the interfacing device and the monitor are separate from the electronic camera, and which further includes the step of transferring the data for the designated images directly from the electronic camera to the interfacing device.

5. The method of claim 4 which further includes the step of using controls coupled with the camera for transferring the data from the electronic camera to the interfacing device.

6. The method of claim 4 which further includes the step of automatically transferring the data from the electronic camera to the interfacing device responsive to control signals received from the interfacing device.

7. The method of claim 4 which further includes the step of directly transferring the data for the designated images from the interfacing device to the central processing facility over a data-communicating network.

8. The method of claim 1 which further includes the step of automatically and serially displaying the acquired images on the monitor.

9. The method of claim 8 which further includes the step of displaying groups of the acquired images as a slide show display.

10. The method of claim 8 which further includes the step of displaying all of the acquired images as thumbnail images.

11. The method of claim 1 wherein the processing includes the step of applying the designated images to a selected medium for receiving images.



12. The method of claim 1 wherein the applying includes the step of producing print reproductions of the designated images:

13. The method of claim 11 wherein the applying includes the step of recording the designated images on a data storing memory device.

14. The method of claim 11 wherein the processing includes the step of applying the designated images to different media for receiving images, and wherein the method further includes the step of selecting the designated images to be applied to each of the different media:

15. The method of claim 1 wherein the transferring of the data for the designated images from the interfacing device to the central processing facility includes the step of transferring the data over a distributed data communicating network comprising the Internet.

16. The method of claim 1 wherein the transferring of the data for the designated images from the interfacing device to the central processing facility includes the step of transferring the data over a distributed data communicating network comprising the switched telephone network.

17. The method of claim 1 wherein the transferring of the data for the designated images from the interfacing device to the central processing facility includes the step of transferring the data over a dedicated data communicating network.

18. The method of claim 1 which further includes the step of remotely operating the interfacing device using

a remote control device.

19. The method of claim 1 which further includes the step of processing orders corresponding to the designated images, wherein the processing of the orders includes the steps of:

5 running an order managing program responsive to the image selecting and the image processing steps; displaying orders produced using the order managing program using an order display program, including  
10 providing a visual display of the orders; providing the order managing program with billing information corresponding to the orders being processed using a billing program, providing the billing information for the visual display of the orders and for producing  
15 invoices for the orders being processed; and providing the billing program with pricing information using a pricing program, providing the billing program with pricing for producing the visual display of the orders and the invoices for the orders being processed.

20 20. The method of claim 19 which further includes the step of producing a file containing an order header including customer information and an image file containing the designated images associated with the orders processed by the order managing program.

25 21. The method of claim 19 which further includes the step of developing and providing financial reports using a financial reports program coupled with the billing program.

30 22. The method of claim 19 which further includes the step of developing and providing statistical reports using a statistical reports program coupled with the billing program.

23. The method of claim 1 which further includes the step of electronically sending the processed images to a user performing the selecting step.

24. The method of claim 1 which further includes the step of electronically sending the processed images to a location remote from a user performing the selecting step, and designated by the user.

25. A system for processing electronically acquired images, comprising:

10 means for capturing a plurality of the images, and for storing data corresponding to the captured images in memory associated with the capturing means, thereby acquiring the plurality of images;

means for transferring the stored data

15 corresponding to the acquired images to interfacing means for communicating with a central processing facility;

means for displaying the acquired images on a monitor coupled with the interfacing means so that each of the acquired images can be viewed on the monitor;

20 means for selecting between the acquired images displayed on the monitor and for designating acquired images for further processing, using the interfacing means;

means for transferring the stored data corresponding to the designated images from the interfacing

25 means to the central processing facility; and

means for processing the stored data corresponding to the designated images at the central processing facility.

APPENDIX A

-----file begin-----

## ORDERHEADER\_BEGIN

## USERINFO\_BEGIN

HOTELNAME                    alphanumeric - text → entry by office  
 REGISTER\_DATE                date when Present guest was registered as New → entry by Guest PC  
 DATE                         YYYY.MM.DD → entry by Guest PC  
 TIME                         HH:MM (in 24 h time) → entry by Guest PC  
 ROOM\_NUMBER                 alphanumeric - text → entry by Guest PC (by serviceman to Guest PC)  
 GUEST\_NAME                  Last, CAPITAL letters → entry by Guest to Guest PC  
 GUEST\_STATUS                1=New, 0=Present → entry by Guest PC, see Guest Archive formula  
 PAYMENT\_METHOD              0=Cash, Credit=1, Unknown=2 → entry by office  
 CONFIRMATION\_NUM            ROOM\_NUM.YY.MM.DD.HH.MM → entry by Guest PC  
 NUM\_PICTURES\_TAKEN         Number of all downloaded pictures → entry by Guest PC  
 USERINFO\_END

## PRICELIST\_BEGIN

→ all entries by office  
 EFFECTIVE\_DATE              = Start date for this price, YYYY.MM.DD  
 EFFECTIVE\_TIME              = Start time for this price, HH.MM (in 24 h time)  
 DELIVERY\_CHARGE            = # (in \$)  
 PHOTOVIEWER\_FEE            = # (in \$, PhotoViewer fee per use)  
 TAX\_RATE                    = # (in %)  
 NUM\_FORMATS                = # (Number of available formats, decimal)  
 FORMAT\_ID                  = # (Format Code, hexadecimal → see Format and Option list)  
     NUM\_SCHEDULES            = # (Number of available schedules, decimal)  
  
     SCHEDULE\_CUT\_OFF         = # (Upper limit, integer)  
     SCHEDULE\_FLAT\_FEE        = # (Flat fee within these brackets, in \$)  
     SCHEDULE\_PRICE\_PER\_UNIT = # (Price per unit within these brackets, in \$),  
  
     SCHEDULE\_CUT\_OFF         = # (Upper limit, integer)  
     SCHEDULE\_FLAT\_FEE        = # (Flat fee within these brackets, in \$)  
     SCHEDULE\_PRICE\_PER\_UNIT = # (Price per unit within these brackets, in \$)

Repeat NUM\_SCHEDULES times

FORMAT\_ID                  = # (Format Code, hexadecimal)  
     NUM\_SCHEDULES            = # (Number of available schedules, decimal)  
  
     SCHEDULE\_CUT\_OFF         = # (Upper limit, integer)  
     SCHEDULE\_FLAT\_FEE        = # (Flat fee within these brackets, in \$)  
     SCHEDULE\_PRICE\_PER\_UNIT = # (Price per unit within these brackets, in \$)

SCHEDULE\_CUT\_OFF = # (Upper limit, integer)  
 SCHEDULE\_FLAT\_FEE = # (Flat fee within these brackets, in \$)  
 SCHEDULE\_PRICE\_PER\_UNIT = # (Price per unit within these brackets, in \$)

Repeat NUM\_SCHEDULES times

Repeat NUM\_FORMATS times

ORDERED\_NUM\_FORMATS = # (Number of formats ordered, decimal)  
 FORMAT\_ID = # (Format Code, hexadecimal)  
 NUM\_UNITS = # (Number of units ordered in this format)  
 PICTURE\_NAME = alphanumeric (Picture Name)  
 NUM\_OPTIONS = # (Number of options)  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)  
  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)

Repeat NUM\_OPTIONS times

PICTURE\_NAME = alphanumeric (Picture Name)  
 NUM\_OPTIONS = # (Number of options)  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)  
  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)

Repeat NUM\_OPTIONS times

Repeat NUM\_UNITS (i.e., number of units ordered in this format) times

FORMAT\_ID = # (Format Code, hexadecimal)  
 NUM\_UNITS = # (Number of units ordered in this format)  
 PICTURE\_NAME = alphanumeric (Picture Name)  
 NUM\_OPTIONS = # (Number of options)  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)  
  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)

Repeat NUM\_OPTIONS times

PICTURE\_NAME = alphanumeric (Picture Name)  
 NUM\_OPTIONS = # (Number of options)  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)  
  
 OPTION\_CODE = # (Option ID)  
 NUM\_COPIES = # (Number of copies in this option)

Repeat NUM\_OPTIONS times

Repeat NUM\_UNITS (i.e., number of units ordered in this format) times

Repeat ORDERED\_NUM\_FORMATS times

ORDERED_NUM_FORMATS	= # (Number of formats ordered, decimal)
FORMAT_ID	= # (Format Code, hexadecimal)
NUM_UNITS	= # (Number of units ordered in this format)
TOTAL_FORMAT_BILL	= # (Total charge for this format, in \$)

FORMAT_ID	= # (Format Code, hexadecimal)
NUM_UNITS	= # (Number of units ordered in this format)
TOTAL_FORMAT_BILL	= # (Total charge for this format, in \$)

Repeat ORDERED\_NUM\_FORMATS times

TOTAL_BILL_DELIVERY	= # (DELIVERY_CHARGE, in \$)
TOTAL_BILL_PRETAX	= # (Total charge before tax, in \$)
TOTAL_TAX	= # (TAX_RATE, in \$)
TOTAL_BILL	= # (Total Bill, in \$)

-----file end-----

#### Guest Archive Formula

The formula is used by the Network Server in the office:

IF GUEST\_NAME = 1 (New)

THEN open NEW\_GUEST\_DIRECTORY AND close and archive the present GUEST\_DIRECTORY  
OTHERWISE add to the present GUEST\_DIRECTORY after the Order has been processed.

#### Schedule Formula

Schedule is a bracket from-to to which the formula applies:

From one to first SCHEDULE\_CUT\_OFF apply first price (flat fee and/or price per unit)  
From first (SCHEDULE\_CUT\_OFF + 1) to second SCHEDULE\_CUT\_OFF apply second price,  
etc.

#### General Formula:

From previous (SCHEDULE\_CUT\_OFF + 1) to current SCHEDULE\_CUT\_OFF apply SCHEDULE\_FLAT\_FEE  
and SCHEDULE\_PRICE\_PER\_UNIT for this schedule

Calculate bill within this schedule

Total bill for this Format = sum of all within-the-schedule bills

Where:

First SCHEDULE\_CUT\_OFF = 0

Last SCHEDULE\_CUT\_OFF = -1

"-1" stands for "infinity"

## USERINFO

ROOM is in text format (to allow for letters, as in 24A).  
GUEST\_NAME is in text format, capital letters only. One word, maximum 100 characters each.

## ORDERLIST - (office only)

To each output file:

## Print Order

Add DONE field. Initialize it to FALSE.  
Copy user info plus all elements of Order List which call for prints.  
Append list of pictures needed.

## Record Order

Add DONE field. Initialize it to FALSE.  
Copy user info plus all elements of Order List which call for records.  
Append list of Pictures needed.

## PT Billing

Copy User Info plus all elements of Order List except:

- picture names
- consolidate pictures by options

Print total number of pictures printed, total number of pictures recorded.  
Append Billing Information present in ON file.

1/5

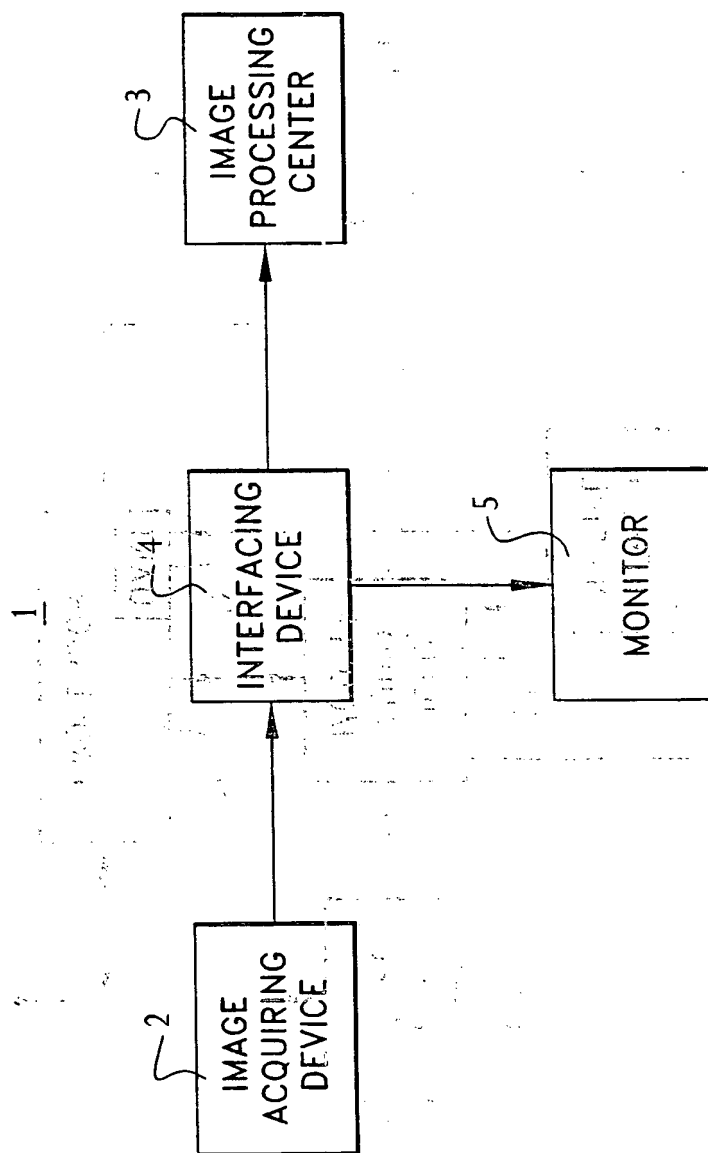


FIG. 1



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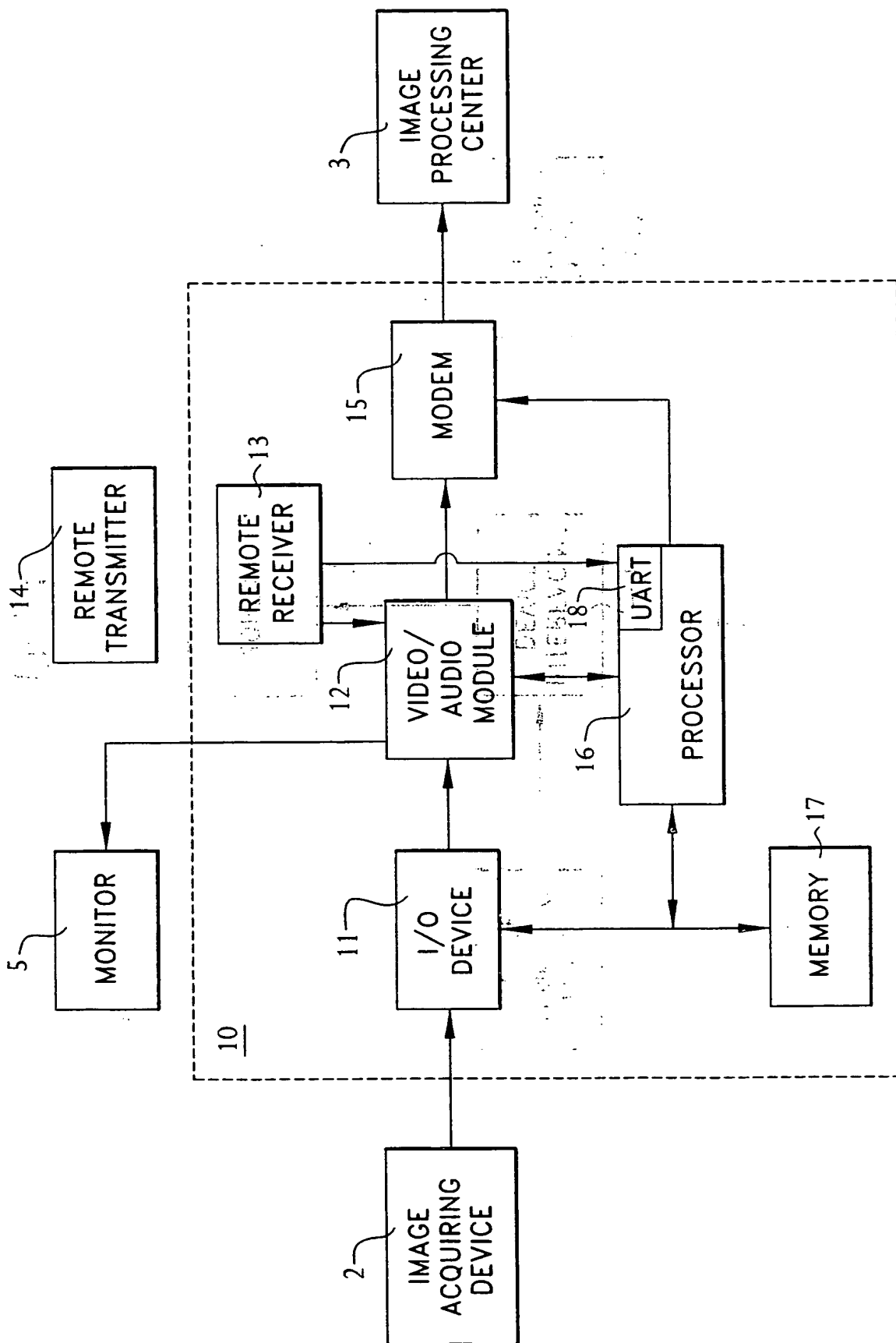


FIG. 2

SUBSTITUTE SHEET (RULE 26)

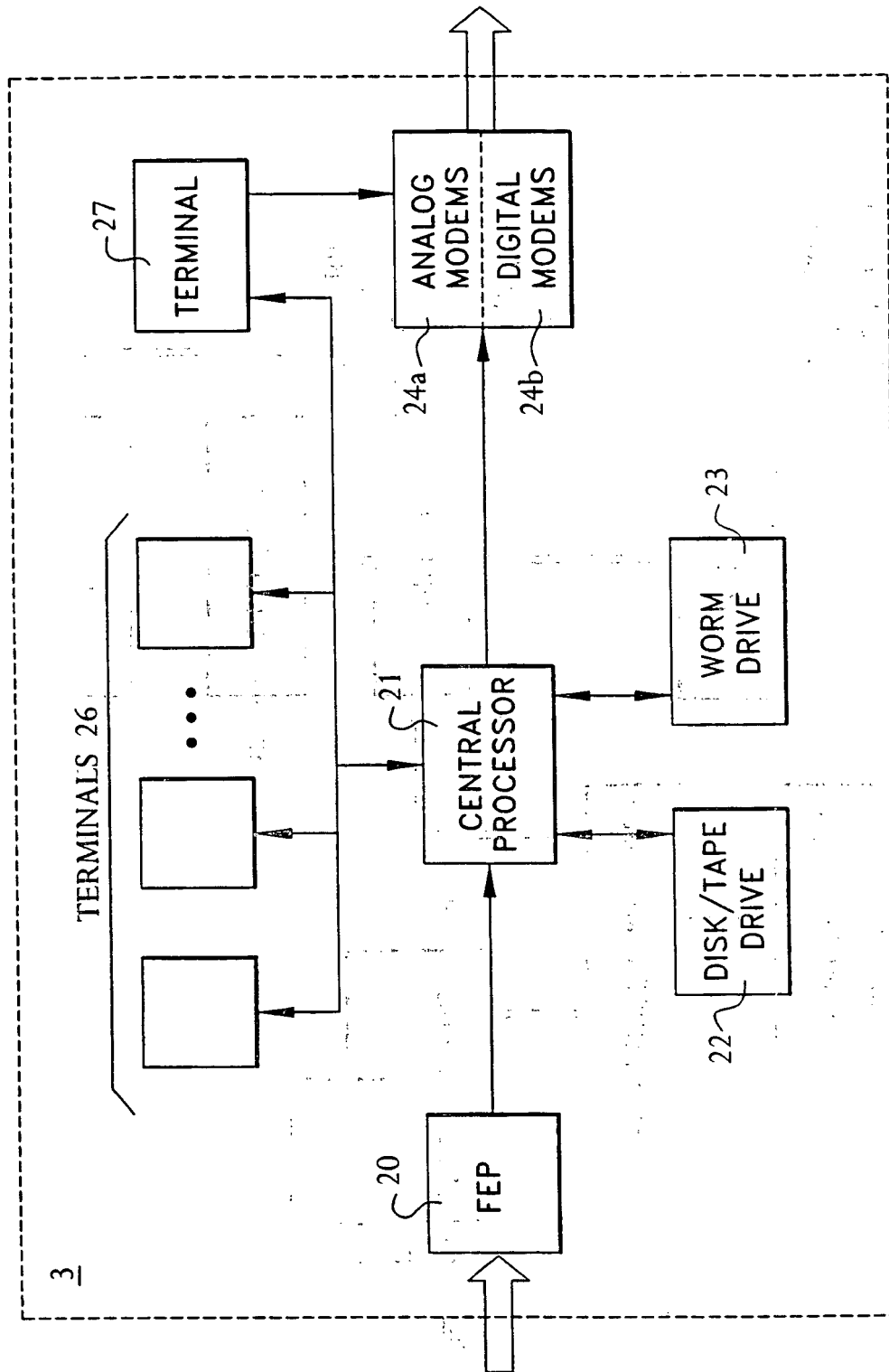


FIG. 3

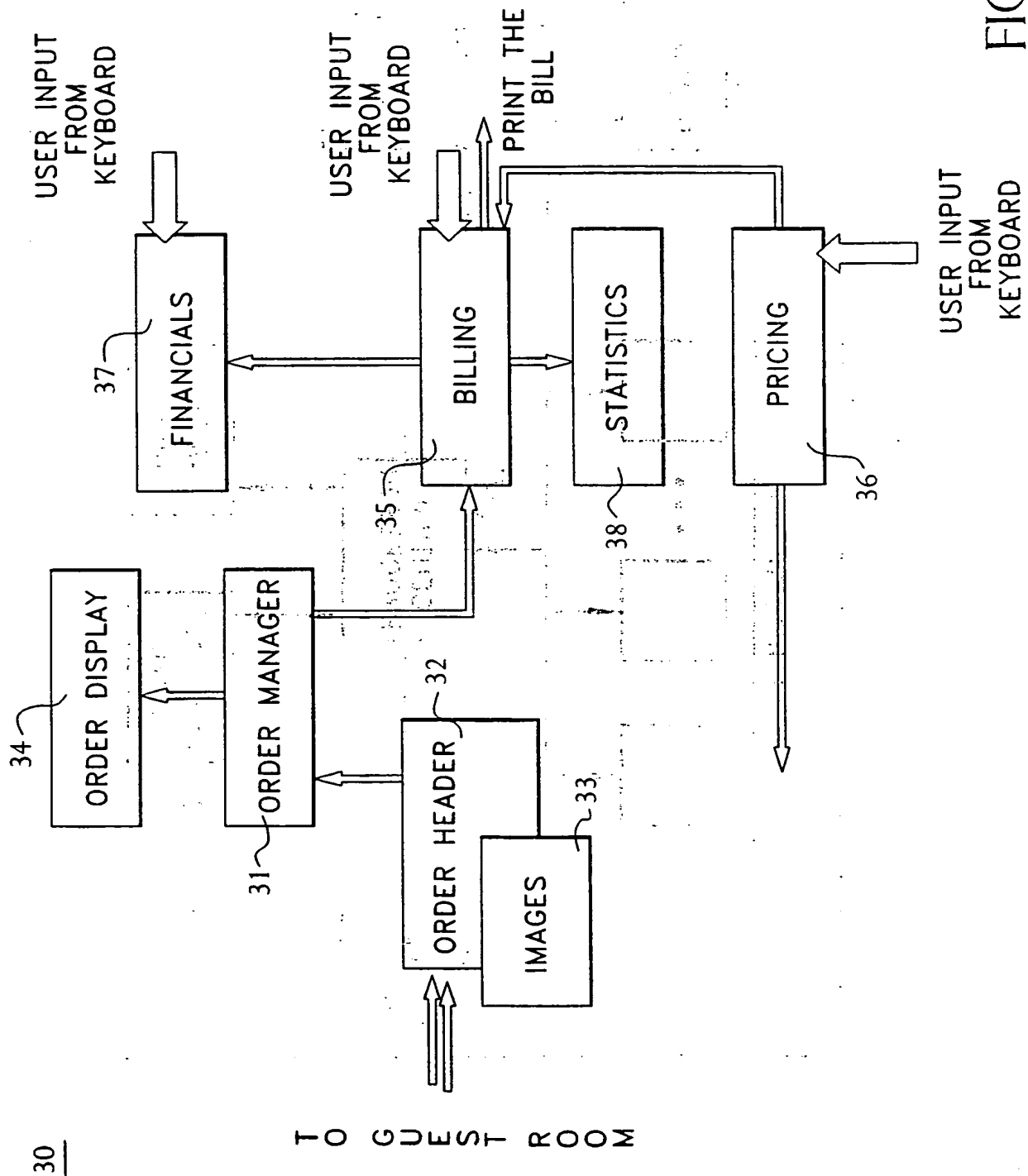


FIG. 4

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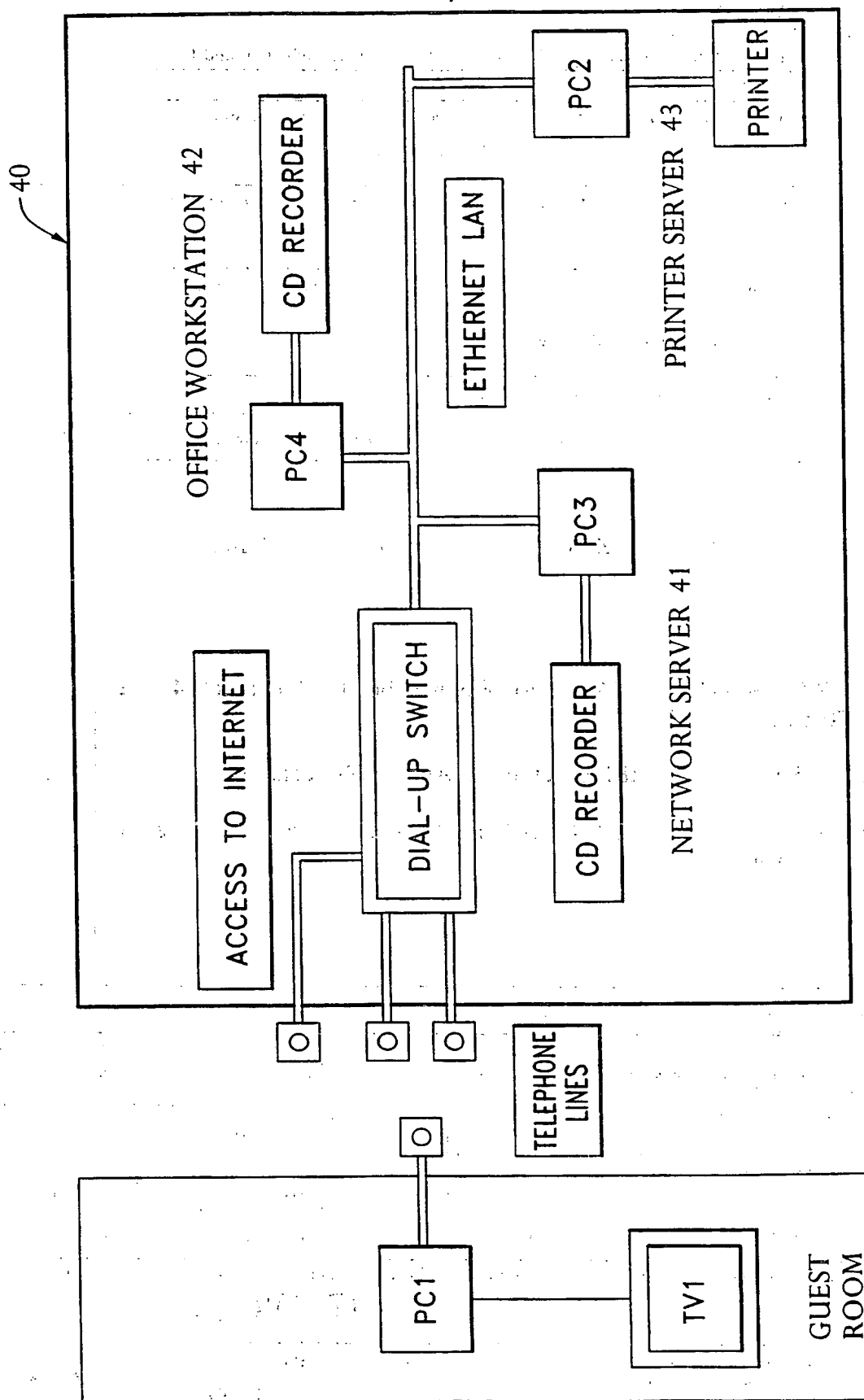


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/27758

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04N 5/225, 9/04

US CL : 348/207, 220, 231, 552

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 348/207, 220, 231, 552, 3, 7, 10; 705, 26, 27, 40; 709/217, 218, 219

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

camera, memory, display or monitor, billing, network

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,754,227 A (FUKUOKA) 19 May 1998, cols. 3 and 4.	1, 2, 4-6, 18, 23-25
Y		3, 7-17, 19-22
Y	US 5,689,644 A (DIAZ et al) 18 November 1997, col. 4, lines 50-68 and col. 5.	3, 7-17, 19-22
A	US 5,894,589 A (REBER et al) 13 April 1999, cols. 3-4.	1-25
A	US 5,142,310 A (TANIGUCHI et al) 25 August 1992, entire document.	1-25



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

18 FEBRUARY 2000

Date of mailing of the international search report

07 MAR 2000

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/27758

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,815,201 A (HASHIMOTO et al) 29 September 1998, cols. 3 and 4.	1-25

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